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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[Field of the Invention]

[0001]

This invention makes two or more base transceiver stations the group of masterslave composition, and relates to the master base station and slave base stations which constitute the mobile communications system with which a master base station controls the communications processing of slave base stations and a mobile communication terminal, and this.

[Background of the Invention]

[0002]

As a mobile communications system which two or more base transceiver stations which communicate with a mobile communication terminal connect to a network via a wire circuit, there are a personal handy phone system (PHS;Personal Handyphone System) etc. Such a mobile communications system may carry out group control in order to realize a multi-channel communication interface to a mobile communication terminal.

[0003]

When performing group control, two or more base transceiver stations are made into the group of masterslave composition, and a master base station controls the communications processing of slave base stations and a mobile communication terminal via a wire circuit and a network. Thereby, many channel connection can be carried out between mobile communication terminals by the communications channel of the number according to the number of slave base stations in a group.

[0004]

In the conventional mobile communications system, when performing group control which was mentioned above, concentrated control of the wire circuit and wireless circuit of each base

transceiver station which carry out group control by a master base station is carried out (for example, refer to patent documents 1). In the case where group control is not performed, control, with a wire circuit and a wireless circuit is performed individually in each base transceiver station.

[0005]

[Patent documents 1] JP,9-327066,A

[Description of the Invention]

[Problem(s) to be Solved by the Invention]

[0006]

In the conventional mobile communications system, if the number of base transceiver stations which carries out group control is made to increase from a master base station controlling intensively the wire circuit and wireless circuit of slave base stations in group control, the control load of a master base station will become large intensively. For this reason, the technical problem that number connection of the request of the base transceiver station which carries out group control may be unable to be made occurred.

[0007]

If not connectable [number of sets of a request of the base transceiver station which carries out group control], even if the service subscribers of a system will increase in number, for example and communicative traffic volume will increase, A communication channel number cannot be made to increase according to this, but it can respond to change of a communication state flexibly. In the system which needs to arrange the wireless circuit control channel which it has in a time slot which is different by the same channel for every base transceiver station. The wireless circuit control channel which can be arranged since the number of time slots has a maximum has a maximum, and there is a limit also in increasing the number of install stands of the base transceiver station which transmits a wireless circuit control channel, and making a communication channel number increase.

[0008]

On the other hand, if changing a master base station into the computer which has higher arithmetic proficiency etc. adds hardware change to a master base station, it can increase it by the number of a request of the base transceiver station which carries out group control.

[0009]

However, in this method, whenever it increases the number of the base transceiver station which carries out group control according to the increase in the amount of communications traffics, throughput must change a master base station into expensive high hardware constitutions further.

[0010]

Were made in order that this invention might solve the above technical problems, and

especially change of hardware constitutions ***** , And it aims at obtaining the master base station and slave base stations which constitute the mobile communications system which can increase and carry out many channel connection of the number of the base transceiver station which carries out group control without control load focusing on a master base station, and this.

[Means for Solving the Problem]

[0011]

Connect a mobile communications system concerning this invention to a common electric-telecommunication-lines network via a wire circuit, and. In a mobile communications system provided with two or more base transceiver stations which communicate via a wireless circuit between mobile stations, Other base transceiver stations are made into slave base stations only in a master base station which consists of at least one in two or more above-mentioned base transceiver stations, A wireless circuit side control part which performs control management through these wireless circuits is provided, and a wire-circuit side control part which performs control management which passed the above-mentioned wire circuit to two or more base transceiver stations of all is provided, respectively.

[Effect of the Invention]

[0012]

According to this invention, connect with a common electric-telecommunication-lines network via a wire circuit, and. In the mobile communications system provided with two or more base transceiver stations which communicate via a wireless circuit between mobile stations, Other base transceiver stations are made into slave base stations only in the master base station which consists of at least one in two or more above-mentioned base transceiver stations, The wireless circuit side control part which performs control management through these wireless circuits is provided, and the wire-circuit side control part which performs control management which passed the wire circuit to two or more above-mentioned base transceiver stations is provided, respectively. Each base transceiver station can perform control management individually via a wire circuit, and can make each base transceiver station distribute the load which the control management by the side of a wire circuit takes by having this composition.

[0013]

Therefore, without changing the hardware constitutions in particular of the computer which constitutes a master base station, since control load does not focus on a master base station, The effect that the number of the base transceiver station which carries out group control by the above-mentioned masterslave composition can be increased conventionally easily is acquired. It is effective in the many channel connection according to a communication state being easily realizable in the system concerned.

[0014]

Since the wireless circuit side control part which performs control management through a wireless circuit was provided only in the master base station, when the number of the base transceiver station which carries out group control is increased, the control channel of a wireless circuit does not increase. Thereby, in the system of this invention, it is effective in the resource of the control channel of the wireless circuit which has a maximum in the number of time slots being effectively utilizable.

[Best Mode of Carrying Out the Invention]

[0015]

Embodiment 1.

Drawing 1 is a block diagram showing the composition of the mobile communications system by this embodiment of the invention 1. The group control base station group 100 comprises a base transceiver station which functions as two or more base transceiver stations which function as two or more slave base stations 2, 3, ..., 99, and the master base station 1 which carries out group control of these. At least one or more slave base stations shall exist in the group control base station group 100. It is connected by the circuits 301, 302, ..., 308 between base stations between the base transceiver stations which constitute the master base station 1 and the slave base stations 2, 3, ..., 99.

[0016]

The master base station 1 and the slave base stations 2, 3, ..., 99 are respectively connected to the common network (electric-telecommunication-lines network) 501 via the wire circuits 201, 202, 203, ..., 209. As the network 501, a public network is mentioned, for example. The network 501 in this invention shall also contain the communication exchange (graphic display abbreviation) which intervenes between the wire circuits 201, 202, 203, ..., 209 and the network 501.

[0017]

Each base transceiver stations 1, 2, 3, ..., 99 which constitute the group control base station group 100 via a wireless circuit, and communication are possible for the moving machine (mobile station) 401,402,403. As the moving machine 401,402,403, Personal Digital Assistants corresponding to PHS (Personal Handyphone System), such as a portable telephone terminal and PDA (Personal Digital Assistants), are mentioned, for example.

[0018]

In the mobile communications system of this invention, the wireless circuit control channel control section (wireless circuit side control part) 101 about a wireless circuit is formed only in the master base station 1 among the base transceiver stations which constitute the group control base station group 100. In the control channel by the side of a wireless circuit, the wireless circuit call control signal 411,412,413 exchanged between each moving machine 401,402,403 and the master base station 1 spreads.

[0019]

A wireless circuit call control signal specifies the initial entry of communication through the wireless circuit in this mobile communications system. The base transceiver station which should be carried out a communication interface, for example via a certain moving machine and wireless circuit as an initial entry of the communication specified with this wireless circuit call control signal, the communications channel used in that case, its slot timing, etc. are mentioned.

[0020]

The wireless circuit control channel control section 101 exchanges a wireless circuit call control signal between moving machines via the control channel by the side of a wireless circuit, and controls the wireless communication connection in this mobile communications system.

[0021]

In the communications channel by the side of a wireless circuit, signal transmission is exchanged between each moving machine 401,402,403 and the arbitrary base transceiver stations 1, 2, 3, ..., 99 which constitute the group control base station group 100. The communications channel by the side of a wireless circuit is assigned by the master base station 1 to the base transceiver station which should communicate with a moving machine from the inside of the base transceiver stations 1, 2, 3, ..., 99 which constitute the group control base station group 100.

[0022]

In the mobile communications system of this invention. The wire-circuit control channel control sections (wire-circuit side control part) 111, 112, 113, ..., 119 about the wire circuits 201, 202, 203, ..., 209 are formed in all the base transceiver stations 1, 2, 3, ..., 99 which constitute the group control base station group 100. In the control channel by the side of a wire circuit, the call control signals (control signal) 211, 212, 213, ..., 219 between the base transceiver stations 1, 2, 3, ..., 99 and the network 501 which constitute the group control base station group 100 are exchanged.

[0023]

The call control signals 211, 212, 213, ..., 219 are set up for every [the base transceiver stations 1, 2, and 3 ..., and] 99, and specify the information about the call of the wire-circuit communication with the network 501 side. The wire circuits 201, 202, 203, ..., 209 which should transmit the call control signals 211, 212, 213, ..., 219 are registered into the general calling area 503 at the time of the receipt provided in the memory of the switchboard which is not illustrated in the network 501.

[0024]

The wire-circuit control channel control sections 111, 112, 113, ..., 119, The call control signals

211, 212, 213, ..., 219 are exchanged via the control channel of the wire circuits 201, 202, 203, ..., 209 between the base transceiver stations 1, 2, 3, ..., 99 and the network 501 which constitute the group control base station group 100.

[0025]

All the base transceiver stations 1, 2, 3, ..., 99 which constitute the group control base station group 100, The hardware which the antenna for communicating via a moving machine and a wireless circuit and its radio take, It can embody by computer which executes the program which possesses the hardware which communicates with a network switchboard via a wire circuit, and as which it is operated as a control channel control section mentioned above.

[0026]

Next, operation is explained.

First, for example, operation when a communication connection request occurs to the master base station 1 at the time of the dispatch from the moving machine 402 is explained. If a communication connection request occurs from the moving machine 402 using the wireless circuit call control signal 412, the wireless circuit control channel control section 101 in the master base station 1 will receive the signal 412 concerned via an antenna.

[0027]

The master base station 1 will investigate the slot opening information and carrier sensing information on each base transceiver station in the group control base station group 100, if the above-mentioned signal 412 is received via the wireless circuit control channel control section 101.

[0028]

And the master base station 1 determines the base transceiver station, the communications channel, and slot timing which are assigned as what should be carried out based on the information on results of an investigation, and should be carried out a communication interface to the moving machine 402. Here, the slave base stations 2 which are base transceiver stations in the group control base station group 100 should be assigned as a base transceiver station which should communicate with the moving machine 402.

[0029]

Then, the wireless circuit control channel control section 101 of the master base station 1 notifies the moving machine 402 which slot timing of which channel it assigned using the wireless circuit call control signal 412.

[0030]

On the other hand, the master base station 1 notifies the information about the communications channel and slot timing which were determined as mentioned above, information peculiar to the moving machine 402 which should be carried out a communication interface, the information on a call, etc. to the slave base stations 2 via the circuit 301 between

base stations.

[0031]

As information peculiar to the moving machine 402, there are information peculiar to certification information on a telephone number, the password about the authenticating processing of an ID number and a user, etc., etc., for example. As information on a call, there are information which specifies the gestalt of communications, such as a sound or data communications, for example, transmission speed, connection destination information, etc.

[0032]

Thus, the slave base stations 2 and the moving machine 402 start radio using the wireless circuit signal transmission 422 by the communications channel and slot timing which were notified by the master base station 1.

[0033]

On the other hand, in the wire-circuit control channel control section 112 of the slave base stations 2, the call control signal 212 is exchanged via the control channel of the wire circuit 202, and call control by the side of the network 501 is performed. Thereby, the slave base stations 2 start communication through the communications channel of the wire circuit 202 the network 501 side.

[0034]

Next, the case where the communication connection request using the wireless circuit call control signal 411,412,413 occurs via a wireless circuit from the arbitrary moving machines 401,402,403 is explained.

Also in this case, the master base station 1 assigns the base transceiver station which should be carried out a communication interface from the arbitrary base transceiver stations 1, 2, 3, ..., 99 which constitute the group control base station group 100 containing self.

[0035]

That is, the master base station 1 investigates the slot opening information and carrier sensing information on each base transceiver station in the group control base station group 100 like the operation mentioned above. And the master base station 1 determines the base transceiver station, the communications channel, and slot timing which should be carried out a communication interface to the moving machine which was carried out based on the information on results of an investigation, and has carried out the communication connection request. Here, the base transceiver stations 1, 2, and 3 in the group control base station group 100 should be assigned as a base transceiver station which should communicate with the moving machine 401,402,403.

[0036]

Then, the wireless circuit control channel control section 101 of the master base station 1 notifies the moving machine 401,402,403 which slot timing of which channel it assigned using

the wireless circuit call control signal 411,412,413.

[0037]

On the other hand, the master base station 1 notifies the information about a communications channel or slot timing via the circuit between base stations to the base transceiver stations 2 and 3 assigned as what should communicate. For example, to the base transceiver station 3, the above-mentioned information will be notified via the circuit 301 between base stations, the base transceiver station 2, and the circuit 302 between base stations from the base transceiver station 1.

[0038]

Thus, the arbitrary moving machine 401,402,403 and the base transceiver stations 1, 2, and 3 are the communications channels and slot timing which were notified as mentioned above, and start the radio by the wireless circuit signal transmission 421,422,423.

[0039]

On the other hand, in the wire-circuit control channel control section 111,112,113 of the base transceiver stations 1, 2, and 3, the call control signal 211,212,213 is exchanged via the control channel of the wire circuit 201,202,203, and call control by the side of the network 501 is performed.

[0040]

Thereby, the base transceiver stations 1, 2, and 3 start communication through the communications channel of the wire circuit 201,202,203 the network 501 side. The above operation is the same also about all the base transceiver stations which constitute the group control base station group 100.

[0041]

Next, the operation at the time of being about receipt to a certain moving machine is explained.

Here, receipt should occur, for example to the moving machine 402. The wire circuits 201, 202, 203, ..., 209 are registered into the general calling area 503 at the time of the receipt in the memory of the above-mentioned switchboard in the network 501.

[0042]

The receipt signal from the communications partner which is not illustrated by the side of the network 501 is made into the call control signals 211, 212, 213, ..., 219 by the above-mentioned switchboard, and is transmitted to all the wire circuits 201, 202, 203, ..., 209 registered into the general calling area 503. Thereby, the above-mentioned receipt signal is transmitted to each base transceiver stations 1, 2, 3, ..., 99 as the call control signals 211, 212, 213, ..., 219 via the wire circuits 201, 202, 203, ..., 209.

[0043]

Next, the master base station 1 recognizes the communication destination of the above-

mentioned receipt signal from the call control signal 211 which the wire-circuit control channel control section 111 received. Then, the wireless circuit control channel control section 101 of the master base station 1 transmits a receipt signal to the moving machine 402 using the wireless circuit call control signal 412.

[0044]

In the moving machine 402, reception of the above-mentioned receipt signal will transmit a communication connection request to the master base station 1 using the wireless circuit call control signal 412.

[0045]

Subsequent operations are the same as that of the case where a communication connection request is transmitted from the moving machine 402 mentioned above at the time of dispatch. That is, when a communication connection request occurs from the moving machine 402, the master base station 1 carries out based on the slot opening information and carrier sensing information on each base transceiver station which carry out group control, and the base transceiver station, the channel, and slot timing to assign are determined. Here, the slave base stations 2 should be assigned as a base transceiver station which should communicate with the moving machine 402, for example.

[0046]

Then, the wireless circuit control channel control section 101 of the master base station 1 notifies the moving machine 402 which slot timing of which channel it assigned using the wireless circuit call control signal 412.

[0047]

On the other hand, in addition to the information about the channel and slot timing which are used via the circuit 301 between base stations at the time of communication, the master base station 1 notifies the information peculiar to a moving machine and the information on a call which carry out a communication interface to the slave base stations 2 assigned as what should be carried out a communication interface.

[0048]

Here, as information peculiar to a moving machine which carries out a communication interface, there are a telephone number, an ID number, certification information, etc., for example. As information on a call, there are information which specifies the gestalt of communications, such as a sound or data communications, for example, transmission speed, connection destination information, etc.

[0049]

Thus, the moving machine 402 and the slave base stations 2 start radio using the wireless circuit signal transmission 422 by the communications channel and slot timing which were notified by the master base station 1.

[0050]

On the other hand, in the wire-circuit control channel control section 112 of the slave base stations 2, a receipt response is carried out to the above-mentioned communications partner via the control channel of the wire circuit 202 with the call control signal 212, and a call scenario is formed. By this, the moving machine 402 will start communication with the above-mentioned communications partner via the slave base stations 2, the wire circuit 202, and the network 501.

[0051]

Next, the case where the arbitrary moving machines 401,402,403 have receipt is explained. In this case, the receipt signal over the moving machine 401,402,403 from an unillustrated communications partner linked to the network 501, It is transmitted to each base transceiver stations 1, 2, 3, ..., 99 as the call control signals 211, 212, 213, ..., 219 via the wire circuits 201, 202, 203, ..., 209 registered into the general calling area 503 from the above-mentioned switchboard of the network 501.

[0052]

Then, the master base station 1 reads a receipt signal from the above-mentioned call control signal 211. Thereby, the wireless circuit control channel control section 101 of the master base station 1 transmits the receipt signal concerned to the moving machine 401,402,403 using the wireless circuit call control signal 411,412,413.

[0053]

In the moving machine 401,402,403, reception of the above-mentioned receipt signal will transmit a communication connection request to the master base station 1 using the wireless circuit control signal 411,412,413. The master base station 1 will assign the base transceiver station which should communicate from the base transceiver stations 1, 2, 3, ..., 99 which are performing group control, if the wireless circuit control channel control section 101 receives the communication connection request from the moving machine 401,402,403.

[0054]

That is, the master base station 1 investigates the slot opening information and carrier sensing information on each base transceiver station in the group control base station group 100 like the operation mentioned above. And the master base station 1 determines the base transceiver station, the communications channel, and slot timing which should be carried out a communication interface to the moving machine which was carried out based on the information on results of an investigation, and has carried out the communication connection request. Here, the base transceiver stations 1, 2, and 3 should be assigned as a base transceiver station which should communicate with the moving machine 401,402,403.

[0055]

Then, the wireless circuit control channel control section 101 of the master base station 1

notifies the moving machine 401,402,403 which slot timing of which channel it assigned using the wireless circuit call control signal 411,412,413.

[0056]

The master base station 1 notifies the information about a communications channel or slot timing via the circuit between base stations to the base transceiver stations 2 and 3. For example, to the slave base stations 3, it will be notified via the circuit 301,302 between base stations.

[0057]

Thereby, the moving machine 401,402,403 and the base transceiver stations 1, 2, and 3 are the communications channels and slot timing which were notified as mentioned above, and start the radio by the wireless circuit signal transmission 421,422,423.

[0058]

On the other hand, in the wire-circuit control channel control section 111,112,113 of the base transceiver stations 1, 2, and 3, a receipt response is carried out to the above-mentioned communications partner via the control channel of the wire circuit 201,202,203 with the call control signal 211,212,213, and a call scenario is formed.

[0059]

Thereby, the moving machine 401,402,403 starts communication with the above-mentioned communications partner via the base transceiver stations 1, 2, and 3, the wire circuit 201,202,203, and the network 501. The above operation is the same also about all the base transceiver stations which constitute the group control base station group 100.

[0060]

As mentioned above, this Embodiment 1 forms the wireless circuit control channel part 101 which controls the control channel by the side of a wireless circuit only in the master base station 1, It is characterized by forming the wire-circuit control channel control sections 111, 112, 113, ..., 119 which control the control channel by the side of a wire circuit to each base transceiver stations 1, 2, 3, ..., 99 which constitute the group control base station group 100, respectively.

[0061]

By this composition, call control with the network 501 with which the base transceiver stations 1, 2, 3, ..., 99 passed the wire circuit for every call can be performed, and each base transceiver stations 1, 2, 3, ..., 99 can be made to distribute the processing load which the call connection by the side of a wire circuit takes.

[0062]

Therefore, since control load does not focus on the master base station 1, the number of the base transceiver station which carries out group control conventionally can be increased easily, without changing the hardware constitutions in particular of the computer which

constitutes the master base station 1. The many channel connection according to a communication state is also easily realizable.

[0063]

A base transceiver station can be easily added to the group control base station group 100 by the base transceiver stations 1, 2, and 3, ..., forming the wire-circuit control channel control sections 111, 112, 113, ..., 119 for every 99.

[0064]

That is, in the conventional system, since only the master base station was performing control by the side of the wire circuit of slave base stations, the wire circuit of the base transceiver station newly added to a group control base station group had to be connected in an order in consideration of control by a master base station.

[0065]

On the other hand, in this invention, since the base transceiver stations 1, 2, 3, ..., 99 perform call control of a wire circuit separately, the wire circuits 201, 202, 203, ..., 209 can be wired, without being conscious of the connection order.

[0066]

Since the wireless circuit control channel control section 101 which controls the control channel by the side of a wireless circuit was formed only in the master base station 1, when the number of the base transceiver station which carries out group control is increased, the control channel of a wireless circuit does not increase. Thereby, in the system by this embodiment, the resource of the control channel of the wireless circuit which has a maximum in the number of time slots is effectively utilizable.

[0067]

Embodiment 2.

Drawing 2 is a block diagram showing the composition of the mobile communications system by this embodiment of the invention 2. In addition to the composition of the system by the above-mentioned Embodiment 1 shown in Drawing 1, the system by this embodiment possesses the base transceiver station maintenance control device 502 connected via the network 501 and the wire circuit 511.

[0068]

The base station maintenance control device 502 has the wire-circuit control channel control section (wire-circuit side control part) 531 which controls the control channel of the wire circuit 511. In the control channel of the wire circuit 511, an exchange of the control signal (maintenance information) 521 is performed via the wire circuit 511 between the base station maintenance control device 502 and the network 501.

[0069]

The communication interface of the base transceiver station maintenance control device 502 is

carried out to the base transceiver stations 1, 2, 3, ..., 99 via the wire circuits 201, 202, 203, ..., 209 by the wire-circuit control channel control section 531. Thus, the base transceiver station maintenance control device 502, Maintenance control is directly performed to each base transceiver stations 1, 2, 3, ..., 99 using the maintenance control signals (maintenance information) 221, 222, 223, ..., 229 exchanged by the wire circuits 201, 202, 203, ..., 209. Here, as a maintenance process of a base transceiver station, there are the blockade of call surveillance, obstacle surveillance, a wireless circuit and a wire circuit, a control channel, etc., unblocking, remote regulation, traffic data collection, and various kinds of examinations, for example.

[0070]

The base transceiver station maintenance control device 502 can be embodied by computer which executes the program which possesses the hardware which communicates with the switchboard of the network 501 via the wire circuit 511, and as which it is operated as the control channel control section 531 mentioned above.

[0071]

Next, operation is explained.

Henceforth, explanation is omitted about the same operation as the above-mentioned Embodiment 1, and the operation about the maintenance control of the base transceiver station by the base transceiver station maintenance control device 502 peculiar to this embodiment is explained. The case where the base station maintenance control device 502 performs maintenance control of the slave base stations 2 is mentioned as an example.

[0072]

First, the base station maintenance control device 502 generates control information required for the maintenance process in the slave base stations 2. Then, the wire-circuit control channel control section 531 transmits to the network 501 side via the control channel of the wire circuit 511 by making the above-mentioned control information into the control signal 521.

[0073]

The switchboard which is not illustrated [of the network 501] transmits to the slave base stations 2 via the control channel of the wire circuit 202 by making the above-mentioned control signal 521 into the maintenance control signal 222. According to the control information acquired from this maintenance control signal 222, the slave base stations 2 perform a self maintenance process.

[0074]

The slave base stations 2 pass the information concerned to the wire-circuit control channel control section 112, when the information which should be transmitted to the base station maintenance control device 502 in a self maintenance process occurs. In the wire-circuit control channel control section 112, it transmits to the network 501 side by making the

information concerned into the maintenance control signal 222 via the control channel of the wire circuit 202.

[0075]

The switchboard which is not illustrated [of the network 501] transmits to the base station maintenance control device 502 via the control channel of the wire circuit 511 by making the above-mentioned maintenance control signal 222 into the control signal 521, using the information etc. which are acquired from the above-mentioned control signal 521 in the base station maintenance control device 502 -- the next -- maintenance control is performed.

[0076]

Maintenance control same about other base transceiver stations 1, 3, ---, 99 which constitute the group control base station group 100 with the base station maintenance control device 502 is performed.

[0077]

As mentioned above, this Embodiment 2 performs directly maintenance control by the side of a wire circuit to each base transceiver stations 1, 2, 3, ..., 99 where the base station maintenance control device 502 constitutes the group control base station group 100.

[0078]

As the conventional system was mentioned above, the control section which controls the control channel by the side of a wire circuit is provided only in the master base station, and only the master base station was also controlling the maintenance process by the side of the wire circuit in two or more base transceiver stations which carry out group control.

[0079]

Thereby, in the conventional system, the load in the maintenance control by the side of a wire circuit will concentrate on a master base station with the increase in the number of base transceiver stations which carries out group control. Therefore, as long as a master base station is constituted from a computer of the same processing performance, the number of base transceiver stations which carries out group control unescapable will be restricted.

[0080]

On the other hand, in the system by this Embodiment 2, maintenance control of each base transceiver stations 1, 2, 3, ..., 99 is individually carried out directly via the network 501 by the base station maintenance control device 502 unrelated to the composition of the group control base station group 100.

[0081]

Therefore, even if it makes the number of the base transceiver station which constitutes the group control base station group 100 increase, a processing load does not focus on one device only by the base station maintenance control device 502 performing maintenance control to each base transceiver station.

[0082]

Thus, each base transceiver stations 1, 2, 3, ..., 99 can be made to distribute the processing load in the maintenance control by the side of a wire circuit as a result in this Embodiment 2. The number of the base transceiver station which carries out group control conventionally can be increased easily, without this changing the hardware constitutions in particular of the computer which constitutes the master base station 1 like the above-mentioned Embodiment 1. The many channel connection according to a communication state is also easily realizable.

[0083]

Even if it is a case where the master base station 1 becomes uncontrollable according to a certain obstacle, maintenance control about the slave base stations 2, 3, ..., 99 which are other base transceiver stations which constitute the group control base station group 100 can be continued and performed. It has the effect that the procedure of changing slave base stations to a master base station, and making employment of the group control base station group 100 continuing by this becomes easy.

[0084]

As opposed to the slave base stations which should be changed to a master base station in this case, the software operated as a wireless circuit control channel control section via the network 501 from the base station maintenance control device 502 etc. is installed. The wireless circuit control section is beforehand held to each base transceiver station, and it may enable it to change to a master base station with a parameter.

[0085]

Embodiment 3.

Drawing 3 is a block diagram showing the composition of the mobile communications system by this embodiment of the invention 3. Although the system by this embodiment makes basic constitution the system by the above-mentioned Embodiment 1 shown in drawing 1, in the group control base station group 100A, it has not formed the circuits 301, 302, 303, ..., 308 between base stations.

[0086]

Instead of the circuit between these base stations, the wire-circuit control channel control sections 111, 112, 113, ..., 119 perform an exchange of the control signal between base transceiver stations by this embodiment using the control signals 231, 232, 233, ..., 239 between base stations (control signal).

[0087]

Next, operation is explained.

For example, operation when a communication connection request occurs to the master base station 1 at the time of the dispatch from the moving machine 402 is explained. If a communication connection request occurs from the moving machine 402 using the wireless

circuit call control signal 412, the wireless circuit control channel control section 101 of the master base station 1 will receive the signal 412 concerned via an antenna.

[0088]

The master base station 1 will investigate the slot opening information and carrier sensing information on each base transceiver station in the group control base station group 100 via the network 501, if the wireless circuit control channel control section 101 receives the above-mentioned communication connection request. Specifically the wire-circuit control channel control section 111 in the master base station 1, The base station control signal about slot opening information or carrier sensing information is exchanged via the control channel and the network 501 of the wire circuit 201 between the wire-circuit control channel control sections of other base transceiver stations.

[0089]

And the master base station 1 determines the base transceiver station, the communications channel, and slot timing which are assigned as what should be carried out based on the information on results of an investigation, and should be carried out a communication interface to the moving machine 402. Here, the slave base stations 2 which are base transceiver stations in the group control base station group 100 should be assigned as a base transceiver station which should communicate with the moving machine 402.

[0090]

Then, the wireless circuit control channel control section 101 of the master base station 1 notifies the moving machine 402 which slot timing of which channel it assigned using the wireless circuit call control signal 412.

[0091]

On the other hand, the master base station 1 passes the information about the communications channel and slot timing which were determined as mentioned above, information peculiar to the moving machine 402 which should be carried out a communication interface, the information on a call, etc. to the wire-circuit control channel control section 111.

[0092]

As information peculiar to the moving machine 402, there are information peculiar to certification information on a telephone number, the password about the authenticating processing of an ID number and a user, etc., etc., for example. As information on a call, there are information which specifies the gestalt of communications, such as a sound or data communications, for example, transmission speed, connection destination information, etc.

[0093]

In the wire-circuit control channel control section 111, the information about the communications channel and slot timing which were determined as mentioned above as the control signal 231 between base stations which makes the slave base stations 2 a report

destination, It transmits to the switchboard which is not illustrated [of the network 501] via the control channel of the wire circuit 201.

[0094]

The switchboard which is not illustrated [of the network 501] transmits to the slave base stations 2 via the control channel of the wire circuit 202 by making the signal 231 concerned into the control signal 232 between base stations from the report destination of the above-mentioned control signal 231 between base stations.

[0095]

In the wire-circuit control channel control section 112 of the slave base stations 2, communications processing is performed according to the above-mentioned information received as the control signal 232 between base stations from the network 501 side. Thereby, the slave base stations 2 start radio with the moving machine 402 by the communications channel and slot timing which the master base station 1 determined.

[0096]

On the other hand, like the above-mentioned Embodiment 1, the wire-circuit control channel control section 112 of the slave base stations 2 exchanges the call control signal 212 via the control channel of the wire circuit 202, and performs call control by the side of the network 501. Thereby, the slave base stations 2 start the communication by the side of the network 501.

[0097]

The operation mentioned above is the same also in other base transceiver stations, and the control signals 231, 232, 233, ..., 239 between base stations are exchanged between base transceiver stations.

[0098]

As mentioned above, this Embodiment 3 the wire-circuit control channel control sections 111, 112, 113, ..., 119, The control signal between the base transceiver stations which constitute the group control base station group 100A via the wire circuits 201, 202, 203, ..., 209 is exchanged by network 501 course.

[0099]

By constituting in this way, in each base transceiver station, not only the circuit between base stations but the composition for exchanging a control signal via the circuit between base stations is ommissible, and when installing a base transceiver station, it can wire easily.

[0100]

Although the above-mentioned Embodiment 3 showed the example which made the above-mentioned Embodiment 1 basic constitution, what made the above-mentioned Embodiment 2 basic constitution is contained in this invention.

[0101]

Embodiment 4.

Drawing 4 is a block diagram showing the composition of the mobile communications system by this embodiment of the invention 4. The group control base station group 100B comprises a base transceiver station which functions as two or more base transceiver stations which function as two or more slave base stations 2a, 3a, ..., 99a, and the master base station 1a which carries out group control of these. It is connected by the circuits 301, 302, ..., 308 between base stations between the base transceiver stations which constitute the master base station 1a and the slave base stations 2a, 3a, ..., 99a.

[0102]

In the master base station 1a and the slave base stations 2a, 3a, ..., 99a, it has the wire-circuit control channel control sections 111, 112, 113, ..., 119 and the wire-circuit communications channel transmission and reception sections 131, 132, 133, ..., 139, respectively.

[0103]

The wire-circuit control channel control sections 111, 112, 113, ..., 119, It differs in the above-mentioned Embodiment 1, and the control signals 310, 311, 312, ..., 319 are exchanged between the base transceiver stations 1a, 2a, 3a, ..., 99a and the network 501 which constitute the group control base station group 100B via the signal multiplexing part 121.

[0104]

The control signals 310, 311, 312, ..., 319 are equivalent to the call control signals 211, 212, 213, ..., 219 shown by the above-mentioned Embodiment 1, when performing call control the base transceiver stations 1a, 2a, 3a, ..., 99a and by the side of the network 501.

[0105]

In this case, the control signals 310, 311, 312, ..., 319 will be set to every base transceiver station 1a, 2a, and 3a, ..., 99a, and the information about the call of the wire-circuit communication with the network 501 side will be specified.

[0106]

When controlling the maintenance process to the base transceiver stations 1a, 2a, 3a, ..., 99a, the control signals 310, 311, 312, ..., 319 are equivalent to the maintenance control signals 221, 222, 223, ..., 229 shown by the above-mentioned Embodiment 2.

[0107]

In this case, the information in the maintenance process by each base transceiver stations 1a, 2a, 3a, ..., 99a where the control signals 310, 311, 312, ..., 319 were controlled by the base station maintenance control device 502 is set up.

[0108]

The wire-circuit communications channel transmission and reception sections 131, 132, 133, ..., 139, The signal transmission 320, 321, 322, ..., 329 is exchanged via the communications channel of the wire circuit 201 via the signal multiplexing part 121 between the base transceiver stations 1a, 2a, 3a, ..., 99a and the network 501 side.

[0109]

Also in this Embodiment 4, the wireless circuit control channel control section 101 is formed only in the master base station 1a. Like the above-mentioned Embodiment 1, the wireless circuit control channel control section 101 exchanges a wireless circuit call control signal between moving machines via the control channel by the side of a wireless circuit, and controls the wireless communication connection in this mobile communications system.

[0110]

The signal multiplexing part 121 is formed in the master base station 1a. The signal multiplexing part 121 multiplexes the control signal and signal transmission from a wire-circuit control channel control section or the wire-circuit communications channel transmission and reception section to the network 501 side, generates the multiplexed signal 241, and transmits to the network 501 side.

[0111]

The signal multiplexing part 121 relays the control signal and signal transmission from the network 501 side, and transmits to the base transceiver station which should tell the signal concerned. Between the signal multiplexing part 121, and a wire-circuit control channel control section and a wire-circuit communications channel transmission and reception section, it is connected by the circuits 301, 302, 303, ..., 308 between base stations so that communication is possible.

[0112]

The formation part which attached drawing 1 and drawing 2, and identical codes except the composition mentioned above is the same, or is equivalent to it, and operates like the above-mentioned Embodiment 1 and Embodiment 2. Therefore, the explanation about these formation parts is omitted.

[0113]

The slave base stations 2a, 3a, ..., 99a, It can embody by computer which executes the program which possesses the hardware which the antenna for communicating via a moving machine and a wireless circuit and its radio take, and is operated as the control channel control section mentioned above or a communications channel transmission and reception section.

[0114]

On the other hand, the master base station 1a besides the hardware which the antenna for communicating via a moving machine and a wireless circuit and its radio take, It can embody by computer which executes the program which possesses the hardware which communicates with the switchboard of the network 501 via a wire circuit, and as which it is operated as the control channel control section mentioned above, a communications channel transmission and reception section, and a signal multiplexing part.

[0115]

Next, operation is explained.

For example, the case where the communication connection request using the wireless circuit call control signal 411,412,413 occurs via a wireless circuit from the arbitrary moving machines 401,402,403 is explained.

The master base station 1a will investigate the slot opening information and carrier sensing information of each base transceiver station on the group control base station group 100B, if the wireless circuit control channel control section 101 receives the above-mentioned communication connection request.

[0116]

And the master base station 1a determines the base transceiver station, the communications channel, and slot timing which should be carried out a communication interface to the moving machine which was carried out based on the information on results of an investigation, and has carried out the communication connection request. Here, the base transceiver stations 1a, 2a, 3a, ..., 99a in the group control base station group 100B should be assigned as a base transceiver station which should communicate with the moving machine 401,402,403.

[0117]

Then, the wireless circuit control channel control section 101 of the master base station 1a notifies the moving machine 401,402,403 which slot timing of which channel it assigned using the wireless circuit call control signal 411,412,413.

[0118]

Then, the master base station 1a notifies the information about a communications channel or slot timing via the circuit between base stations to the base transceiver stations 2a and 3a assigned as what should communicate. For example, to the base transceiver station 3a, the above-mentioned information will be notified via the circuit 301 between base stations, the base transceiver station 2a, and the circuit 302 between base stations from the master base station 1a.

[0119]

Thus, the arbitrary moving machine 401,402,403 and the base transceiver stations 1a, 2a, 3a, ..., 99a are the communications channels and slot timing which were notified as mentioned above, and start the radio by the wireless circuit signal transmission 421,422,423.

[0120]

On the other hand, the wire-circuit control channel control sections 111, 112, 113, ..., 119 of the base transceiver stations 1a, 2a, 3a, ..., 99a transmit to the signal multiplexing part 121 by making the control signals 310, 311, 312, ..., 319 into a call control signal.

[0121]

In the signal multiplexing part 121, the control signals 310, 311, 312, ..., 319 are multiplexed,

the one multiplexed signal 241 is generated, and call control by the side of the network 501 is performed via the control channel of the wire circuit 201. Thereby, the base transceiver stations 1a, 2a, 3a, ..., 99a start communication between the network 501 sides.

[0122]

The above operation is the same also about all the base transceiver stations which constitute the group control base station group 100B.

[0123]

Next, operation when the arbitrary moving machines 401,402,403 have receipt is explained. The receipt signal over the moving machine 401,402,403 from an unillustrated communications partner linked to the network 501, It is transmitted to the base transceiver station 1a via the communications channel of the wire circuit 201 as the signal transmission 241 for the number of a base station connected, respectively from the switchboard which is not illustrated [of the network 501].

[0124]

The signal multiplexing part 121 of the base transceiver station 1a distributes the above-mentioned signal transmission 241 which exists by the number of a base station from the network 501 side, It transmits to the wire-circuit control channel control sections 111, 112, 113, ..., 119 of each base transceiver stations 1a, 2a, 3a, ..., 99a in the group control base station group 100b as the control signals 310, 311, 312, ..., 319.

[0125]

The wireless circuit control channel control section 101 of the master base station 1a will transmit a receipt signal to the moving machine 401,402,403 using the wireless circuit call control signal 411,412,413, if the wire-circuit communications channel transmission and reception section 131 receives the above-mentioned receipt signal as the signal transmission 320.

[0126]

The moving machine 401,402,403 will transmit a communication connection request to the master base station 1a using the wireless circuit control signal 411,412,413, if the above-mentioned receipt signal is received. In the master base station 1a, the wireless circuit control channel control section's 101 reception of the above-mentioned communication connection request will assign the base transceiver station which should communicate from the base transceiver stations 1a, 2a, 3a, ..., 99a which are performing group control.

[0127]

That is, the master base station 1a investigates the slot opening information and carrier sensing information on each base transceiver station in the group control base station group 100B via the circuits 301, 302, ..., 308 between base stations like the operation mentioned above. And the master base station 1a determines the base transceiver station, the

communications channel, and slot timing which should be carried out a communication interface to the moving machine which was carried out based on the information on results of an investigation, and has carried out the communication connection request. Here, the base transceiver stations 1a, 2a, 3a, ..., 99a should be assigned as a base transceiver station which should communicate with the moving machine 401,402,403.

[0128]

Then, the wireless circuit control channel control section 101 of the master base station 1a notifies the moving machine 401,402,403 which slot timing of which channel it assigned using the wireless circuit call control signal 411,412,413.

[0129]

On the other hand, the master base station 1a notifies the information about the communications channel and slot timing which were determined as mentioned above to the base transceiver stations 1a, 2a, 3a, ..., 99a assigned as what should communicate with the moving machine 401,402,403 via the circuit between base stations. For example, to the slave base stations 3, it will be notified via the circuits 301, 302, ..., 308 between base stations.

[0130]

Thus, the moving machine 401,402,403 and the base transceiver stations 1a, 2a, 3a, ..., 99a are the communications channels and slot timing which were notified as mentioned above, and start the radio by the wireless circuit signal transmission 421,422,423.

[0131]

In the wire-circuit control channel control sections 111, 112, 113, ..., 119 of the base transceiver stations 1a, 2a, 3a, ..., 99a, it transmits to the signal multiplexing part 121 by considering the control signals 310, 311, 312, ..., 319 as a receipt response.

[0132]

The signal multiplexing part 121 multiplexes the control signals 310, 311, 312, ..., 319, generates the one multiplexed signal 241, transmits to the network 501 side via the control channel of the wire circuit 201, carries out a receipt response to the above-mentioned communications partner, and forms a call scenario. Thereby, the moving machine 401,402,403 starts communication with the above-mentioned communications partner via the base transceiver stations 1a, 2a, 3a, ..., 99a, the wire circuit 201, and the network 501.

[0133]

The signal transmission transmitted to the moving machine 401,402,403 from the above-mentioned communications partner is transmitted to the signal multiplexing part 121 of the master base station 1a via the communications channel of the wire circuit 201 from the switchboard which is not illustrated [of the network 501].

[0134]

In the signal multiplexing part 121, the above-mentioned signal transmission is transmitted to

the wire-circuit communications channel transmission and reception section 131,132,133 as the signal transmission 320, 321, 322, ..., 329. The base transceiver stations 1a, 2a, 3a, ..., 99a, If the wire-circuit communications channel transmission and reception sections 131, 132, 133, ..., 139 receive the above-mentioned signal transmission 320, 321, 322, ..., 329, it will transmit to the moving machine 401,402,403 by the wireless circuit signal transmission 421,422,423 via the communications channel of a wireless circuit.

[0135]

The above operation is the same also about all the base transceiver stations which constitute the group control base station group 100B.

[0136]

Next, the operation about the maintenance control of the base transceiver station by the base transceiver station maintenance control device 502 is explained. Here, the case where the base station maintenance control device 502 performs maintenance control of the base transceiver stations 1a, 2a, 3a, ..., 99a is made into an example, and it explains.

[0137]

First, the base station maintenance control device 502 generates control information required for the maintenance process in the base transceiver stations 1a, 2a, 3a, ..., 99a. Then, the wire-circuit control channel control section 531 transmits the above-mentioned control information to the network 501 side via the control channel of the wire circuit 511 as the control signal 521 which makes each base transceiver station a report destination.

[0138]

The switchboard which is not illustrated [of the network 501] transmits the above-mentioned control signal 521 to the signal multiplexing part 121 via the control channel of the wire circuit 201. In the signal multiplexing part 121, the control signal 521 concerned is transmitted to the base transceiver stations 1a, 2a, 3a, ..., 99a as the control signals 310, 311, 312, ..., 319 corresponding to the report destination.

[0139]

According to the control information acquired from these control signals 310, 311, 312, ..., 319, the base transceiver stations 1a, 2a, 3a, ..., 99a perform a self maintenance process.

[0140]

The base transceiver stations 1a, 2a, 3a, ..., 99a pass the information concerned to the wire-circuit control channel control sections 111, 112, 113, ..., 119, respectively, when the information which should be transmitted to the base station maintenance control device 502 in a self maintenance process occurs. In the wire-circuit control channel control sections 111, 112, 113, ..., 119, the above-mentioned information is transmitted to the signal multiplexing part 121 as the control signals 310, 311, 312, ..., 319, respectively.

[0141]

In the signal multiplexing part 121, the control signals 310, 311, 312, ..., 319 are transmitted to the network 501 side via the control channel of the wire circuit 201 as the one multiplexed signal 241.

[0142]

The switchboard which is not illustrated [of the network 501] transmits to the base station maintenance control device 502 via the control channel of the wire circuit 511 by making the above-mentioned multiplexed signal 241 into the control signal 521. The control signal 521 concerned is received by the wire-circuit control channel control section 531 of the base station maintenance control device 502.

[0143]

the base station maintenance control device 502 receives the base transceiver stations 1a, 2a, 3a, ..., 99a using the information etc. which are acquired from the control signal 521 which the wire-circuit control channel control section 531 received -- the next -- maintenance control is performed.

[0144]

Above-mentioned maintenance control shall be similarly performed about other base transceiver stations which constitute the group control base station group 100B.

[0145]

As mentioned above, this Embodiment 4 the signal multiplexing part 121 of the master base station 1a, The control signal and signal transmission which should be exchanged between the base transceiver stations 1a, 2a, 3a, ..., 99a and the network 501 side and including call control and maintenance control by collecting into the one multiplexed signal 241. Control and communication are performed only via the one wire circuit 201 between the networks 501.

[0146]

The group control base station group 100B can be constituted only from connecting only the master base station 1a to the network 501 via the wire circuit 201 by this composition among two or more base transceiver stations which carry out group control, and the wiring at the time of installing a base transceiver station becomes easy.

[0147]

From each base transceiver stations 1a, 2a, 3a, ..., 99a performing control management by the side of a wire circuit individually in a similar manner with the above-mentioned Embodiment 1 to the above-mentioned Embodiment 3. Each base transceiver stations 1a, 2a, 3a, ..., 99a can be made to distribute the processing load which the control by the side of a wire circuit takes.

[0148]

Therefore, control load does not focus on the master base station 1a, without changing the hardware constitutions in particular of the computer which constitutes the master base station 1a. The number of the base transceiver station which carries out group control conventionally

can be increased easily by this, and also the many channel connection according to a communication state is also easily realizable.

[Brief Description of the Drawings]

[0149]

[Drawing 1]It is a block diagram showing the composition of the mobile communications system by this embodiment of the invention 1.

[Drawing 2]It is a block diagram showing the composition of the mobile communications system by this embodiment of the invention 2.

[Drawing 3]It is a block diagram showing the composition of the mobile communications system by this embodiment of the invention 3.

[Drawing 4]It is a block diagram showing the composition of the mobile communications system by this embodiment of the invention 4.

[Description of Notations]

[0150]

1 1a A master base station (base transceiver station), 2-99 and 2a - 99a slave base stations (base transceiver station), 100,100A and 100B A group control base station group and 101 Wireless circuit control channel control section (wireless circuit side control part), 111-119 Wire-circuit control channel control section (wire-circuit side control part), 121 A signal multiplexing part, and 131-139 Wire-circuit communications channel control section, 201-209,511 A wire circuit, and 211-219 Call control signal (control signal), 221-229 A maintenance control signal (control signal), and 231-239 The control signal between base stations (control signal), 241 A multiplexed signal, and 301-308 The circuit between base stations, and 310-319 Control signal, 320-329 Signal transmission, and 401-403 A moving machine (mobile station), and 411-413 Wireless circuit call control signal, 421-423 [General calling area and 521 / A control signal and 531 / Wire-circuit control channel control section (wire-circuit side control part).] Wireless circuit signal transmission and 501 A network (electric-telecommunication-lines network) and 502 A base station maintenance control device and 503

[Translation done.]